

THE RESULTS OF THE USE OF TUBERCULIN  
IN THE CASTLECRAIG HERD.



THE RESULTS  
OF  
THE USE OF TUBERCULIN  
IN THE CASTLECRAIG HERD BELONGING

SIR T. D. GIBSON-CARMICHAEL, BART., M.P.

REPORTED BY

JAMES WILSON, M.A., B.Sc.

FORDYCE LECTURER IN AGRICULTURE, ABERDEEN UNIVERSITY



EDINBURGH:  
GEO. P. JOHNSTON, 33 GEORGE STREET

1896

R26275



## *The Results of the Use of Tuberculin in the Castlecraig Herd.*

THE last few years have added considerably to our knowledge of Tuberculosis. In the belief that what are sometimes referred to as "the Castlecraig experiments" have furnished results that are of some considerable importance and that the experience gained there might be not only interesting but even of some value to cattle-breeders, the following short account of how the disease has been dealt with at Castlecraig is now published. The herd has now been tested with tuberculin three times—in the winters of 1894-95, 1895-96, and 1896-97—and the resulting temperatures of all the animals tested at those three times are appended to this account.

When Sir Thomas Gibson-Carmichael succeeded to the Castlecraig estates, five years ago, the herd of Aberdeen-Angus cattle numbered about forty head all descended from two cows bought by the late Sir W. H. Gibson-Carmichael at the Tillyfour dispersion sale in 1880. Early in 1892, Sir Thomas decided to raise the standard of the herd; and, with this end in view, a number of cattle were purchased at some of the draft and dispersion sales of 1892, 1893, 1894 and 1895. With the same end in view, and at the same time, some of the less valuable of the original Castlecraig cattle were sent to the butcher. In the winter of 1894-95 the herd numbered about eighty head.

Up till about this time the herd had been exceedingly healthy—only one animal had as yet been discarded for irregular breeding—but in the summer of 1894 the health of two cows was seen to be in an unsatisfactory condition. Nothing very serious was apprehended ; but, as a measure of precaution, when the herd came to be housed up for the winter, those two animals were separated from all the others. One of the two produced a dead calf about a month before she ought to have calved ; the other calved at the proper time, but soon developed what seemed to be foul of the foot so seriously that it was decided she should not be bred from again.

At a dinner at Perth in February 1895 two Aberdeen-Angus breeders announced that they had tested their cattle with tuberculin. Before this time, when the two cows were discovered unhealthy, it had almost been decided to use tuberculin, not only upon them but also upon a large portion of the herd ; but the announcements made at Perth finally decided what was to be done, and arrangements were made with Principal Dewar of Edinburgh for testing about forty animals, that is, all the animals, male and female, that were intended then to be bred from—cows, two-year-old heifers and bulls—as well as several of the yearling heifers. The results of the testing were fearfully unexpected and alarming ; for, with the exception of the cow that had produced the dead calf (the cow with foul of the foot was not tested, as she was not to be bred from), the animals tested had the appearance of being healthy and vigorous. But instead of one there were thirteen decided and three suspicious reactions.

The revelations of the tuberculin were so unexpected that it was some time before they could be contemplated with calmness and patience. The first thing done was to separate

the tuberculous from the non-tuberculous animals; but the very serious question was "what next?" The immediate slaughter of all the tuberculous animals was first suggested, but against this there were two very powerful reasons, namely, that the sixteen animals had cost, on the average, about sixty pounds a-piece, and that most of them, at the time of testing, were suckling their calves. A second suggestion was that the animals not suckling calves should be immediately slaughtered and that all the others should be slaughtered when their calves were weaned in the autumn. Against this second suggestion, however, there was still the very powerful argument of the price, and slaughter was carried out only in the case of the cow already mentioned as having produced a dead calf, in the case of another cow that also prematurely produced a dead calf, and in the case of two heifers: the remaining twelve receiving a kind of temporary respite, in the hope that another way than slaughter might be found out of the difficulty. And a way was indicated by the statement of bacteriologists to the effect that *milk as it comes from the udder is germ-free except when the milk gland is in a diseased condition.* A few weeks before the time of testing, one of the tuberculous cows had calved, and she was then seen to have a diseased udder. Her calf was at once transferred to another cow, and the cow herself was slaughtered shortly after testing; but the udders of the remaining eleven tuberculous cows seemed to be sound, and it was decided to go on breeding from them in the usual way, so long as they would breed. The following regulations were, however, gradually developed:—(1) That the tuberculous animals be isolated; (2) that they suckle their calves; (3) that during the winter, excepting in stormy weather, they and their calves along with them be let out to

the field every day; (4) that, as far as possible, they have a bull to themselves; (5) that the calves be weaned in the autumn, but still kept separate from the sound cows' calves until they have been tested and found to be sound; (6) that all the premises in which cattle have been wintered be annually disinfected.

It has not always been possible to carry out the regulations laid down, to the very letter, but the difficulties in the way have gradually diminished, and the following are the only breaches of the regulations that have taken place:—Regulation (1): In March 1894-95 the tuberculous cattle could not be so completely isolated as they have been in the two succeeding winters. At that time the Aberdeen-Angus cattle were kept at two of the farms in Sir Thomas's own occupation—West Mains and Ladyurd—and the isolation carried out at first consisted merely in putting the tuberculous cattle at West Mains and Ladyurd all together in byres at each of those places. During the last and the present winter, however, the tuberculous cattle have all been kept at Castlecraig Home Farm, where arrangements were made for housing them in a small byre and in some loose boxes that formerly had been used for young horses. During 1894-95 the isolation therefore was not altogether satisfactory, but during 1895-96 and 1896-97 it has been complete. Regulation (2): Every tuberculous cow has suckled her own calf, excepting in two cases: those, namely, of the cow already mentioned as having had a diseased udder and of another cow which was the only cow in the tuberculous lot in 1896 having a bull calf: this bull calf was made to change places with a heifer calf from a sound cow. There was really another tuberculous cow with a bull calf in 1896: a cow, namely, that re-acted doubtfully in

March 1895 and did not re-act at all in January 1896. After the first testing she was put among the tuberculous animals, but after the second testing she was unfortunately transferred to the sound premises only to have to be taken back again to the unsound at the third testing. Regulation (4) has been departed from only in several cases and for very necessary reasons. Regulation (5) was not adhered to when the calves were weaned last September and October, because previous testings had shown that there was no need to keep the two sets of calves separate. Regulation (6) was not carried out so soon as might have been desirable after the first testing. Indeed it was not until some time after that the need for disinfection was completely grasped, and, as a result, the byres were not disinfected till the summer of 1895. That means that any animal put into a stall from which a tuberculous animal had been taken in March 1895 was made to run a risk which would have been considerably lessened had even the forestalls been first of all disinfected. The whole premises have, however, in the summers of 1895 and 1896 been disinfected with a hot 5 per cent. solution of carbolic acid which was sprayed over everything: roofs, rafters, walls, floors, gutters and forestalls. Besides this annual general disinfection, the places occupied by the four animals that have had to be transferred from the sound to the unsound herd since March 1895 have been disinfected immediately after the animals were transferred.

Before the second general testing in January 1896 there was a kind of preliminary testing in September 1895 which needs to be specially mentioned, because it showed whether the principles upon which it had been decided to carry on the herd were sound. The crop of bull calves in 1895 numbered twenty, of which seven were from tuberculous cows—one was

from the cow with foul of the foot which, although not tested, was treated as tuberculous—and these seven, along with about as many others from sound cows, were tested in September because it was desirable to have all those bull calves in the same court together as early as possible, and because, if any one of the seven were found tuberculous, he need not have been prepared for being sold in February as a bull, but would have had to have been immediately slaughtered. The result of this preliminary testing was exceedingly encouraging, for every one of the young bulls tested was found to be sound. Two of them were sold before the general testing in January, but all the others were again tested at that time, and were all again found to be sound.

The second general testing took place in January 1896, and all the cattle on the three farms in Sir Thomas Gibson-Carmichael's possession were tested. Not only were all the Aberdeen-Angus cattle tested, but all the dairy cows, chiefly Ayrshires, were also tested. The only one, however, of the dairy cows that concerns us here is a pure bred Aberdeen-Angus cow of the original Castlecraig stock which had been in the dairy for several years. In March 1895 the whole of the Aberdeen-Angus cattle had not been tested: most of the yearling heifers and a number of animals of the original Castlecraig stock were not tested. It had been decided that those original Castlecraig cattle should be fattened and sold off, but after the first testing this decision was reversed: as it was desirable to have sound cattle and when, as yet, none of the original Castlecraig cattle had been discovered unsound, it was thought better to retain those formerly condemned to be fattened and to breed from them. There were, consequently, twice as many animals tested in January 1896

as in March 1895, and the result, as was expected, after the preliminary testing in September, was exceedingly satisfactory : only two animals had to be taken from the sound and added to the gradually diminishing unsound herd. Of the three former doubtfuls, one still remained doubtful, another re-acted decidedly, the third did not re-act at all, and, unfortunately, as already mentioned, was removed to the sound herd. The only unsatisfactory circumstance was the re-acting of the two cows that had not re-acted in the previous March. If they were tuberculous at the first testing, then the tuberculin, which is not an absolutely perfect test, failed ; if they were not tuberculous, then their becoming tuberculous in the meantime might possibly be attributed to the want of disinfection the first testing.

The third general testing has just taken place (in November 1896) and the results are completely satisfactory. In all 89 Aberdeen-Angus cattle have been tested ; but, as six of these were animals recently bought in and as their condition in no way concerns the principles upon which the herd has been managed, the results they give are altogether left out of account. The number of animals tested with which we are concerned is 83, and of these only eight—all now left alive of the original eighteen—had previously re-acted. Those eight animals all re-acted again, and, in addition to them, there was only one other animal. Had the case of this new re-acting animal been an ordinary case—had she been in precisely the same condition as the other eighty-five—the re-action of only one among so many would have been considered very satisfactory, but it so happens that this animal's case is such that the fact of her re-acting is a very strong argument in support of the method adopted

for dealing with the disease. This animal has never, like the other Aberdeen-Angus cows, suckled her calves, but has been used, since January 1894, as a dairy cow. She has thus, for nearly three years, summer and winter, been with the other dairy cows, 50 per cent. of which were found to be tuberculous at the second testing in January 1896. This Aberdeen-Angus cow now referred to did not then re-act, for which, in all probability, we must blame the tuberculin, although there is just a small chance that she may have been infected since January last by another dairy cow that had, in the meantime, to be bought in and was found at the recent testing to be unsound. A point of some interest in connection with this new re-acting cow, and bearing, perhaps, upon the hereditary "predisposition" theory is that she is one of the old Castlecraig stock which, until now, have not produced a single re-acting animal.

Further than being separated from the healthy, the tuberculous animals have received no other special treatment. The usual treatment has been for all animals excepting bulls to be pastured in summer and fed on turnips and hay or straw in winter. Old and heavy milking cows and one and two-year-old heifers have received a small quantity of concentrated food in winter, and animals being prepared for the butcher or show and young bulls have been more liberally treated. It has long been a general rule that every animal shall be outside daily during winter when the weather permits, and this rule has been more strictly adhered to since the time of the first testing. Such treatment has been given to all, sound and tuberculous alike.

The following circumstances may be specially mentioned in connection with the tables of temperatures:—

- (1). Each animal is necessarily designated by a number, because some of the animals were not bred at Castlecraig.
- (2). All animals born in December of one year are entered as calves of the next year. For instance, an animal calved in December 1895 is said to be calved in 1896.
- (3). All re-acting and doubtful temperatures are printed in larger and darker figures. Doubtful temperatures are enclosed in brackets.
- (4). If a set of temperatures appears in one column after an animal's name and does not appear in the next, then that means that in the meantime the animal has been disposed of.
- (5). In the last column will be found the reasons for the disposing of all the tuberculous animals disposed of. When sound animals have been sold the mere fact is mentioned. In this column will also be found any other particulars supposed to have a bearing upon the tuberculosis question.
- (6). In order that the condition of a cow may be readily compared with that of her descendants, their temperatures are arranged together.
- (7). It will be noticed that, at the testing in January 1896, a number of the young bulls showed very high temperatures twenty-four hours before being tested. This is accounted for by their having just come in from the field before their temperatures had to be taken. The temperatures had been raised by exercise and had not yet fallen to the normal. But to make sure that everything was right, the temperatures of the lot were taken again some hours before the injection of tuberculin, and were found to be normal. One bull calf (No. 52),

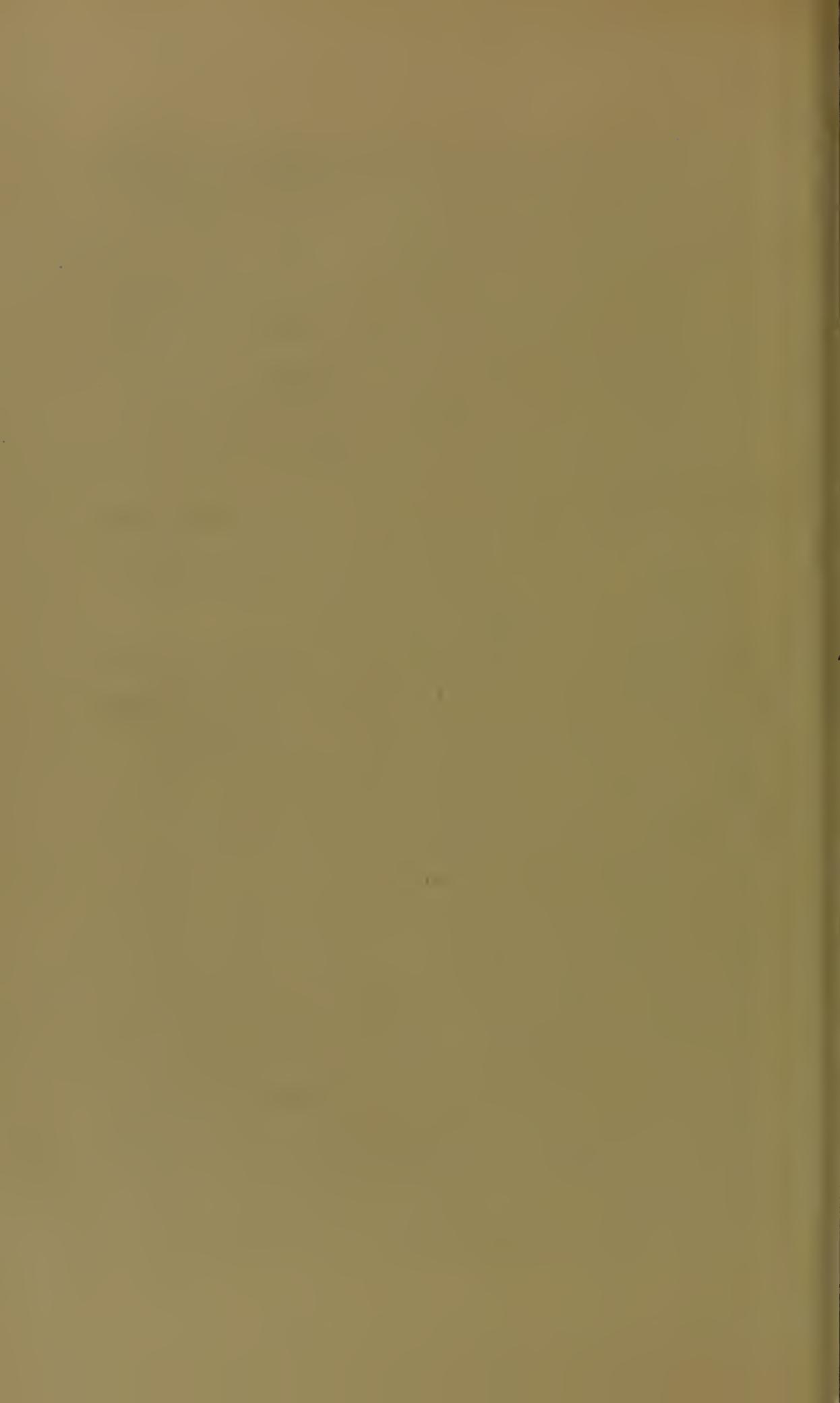
showed a high temperature all through. He was slightly fevered for a day or two at the time of testing.

(8). It will be noticed also that five females (Nos. 12, 22, 25, 38, 64) are marked with an asterisk, and that, although they ought to be, they are not followed by any produce in 1895. These females need to be specially referred to, as they are the only animals in the herd, with the exception of the tuberculous cows, that have been guilty of abortion. Their case, however, can be explained. Three cows, whose calves had just been weaned, were put into a field among six or eight two-year-old heifers in calf. There was immediately a good deal of fighting, and in a few days one of the animals aborted. She was at once isolated and disinfected, and all the others were removed to another field ; but, although this course of isolation and disinfection was continued, in a short time no less than five of the lot had aborted. Whether the abortions were a result of the fighting, or of ergot, of which the pasture was not free, or of some other cause, was not known ; but, in case it should be some infectious form, all the animals that had been in the field together were kept by themselves until the calving season was over and the five that had aborted were specially isolated and disinfected. The further precaution was taken of setting aside a bull for the five aborting cows and for them only, and the result has been that the abortion has gone no farther. One of the five is now (Nov. 23rd) just past her calving time, another is within a week, and another is within five weeks. Unfortunately the other two were not got in calf, and one of them

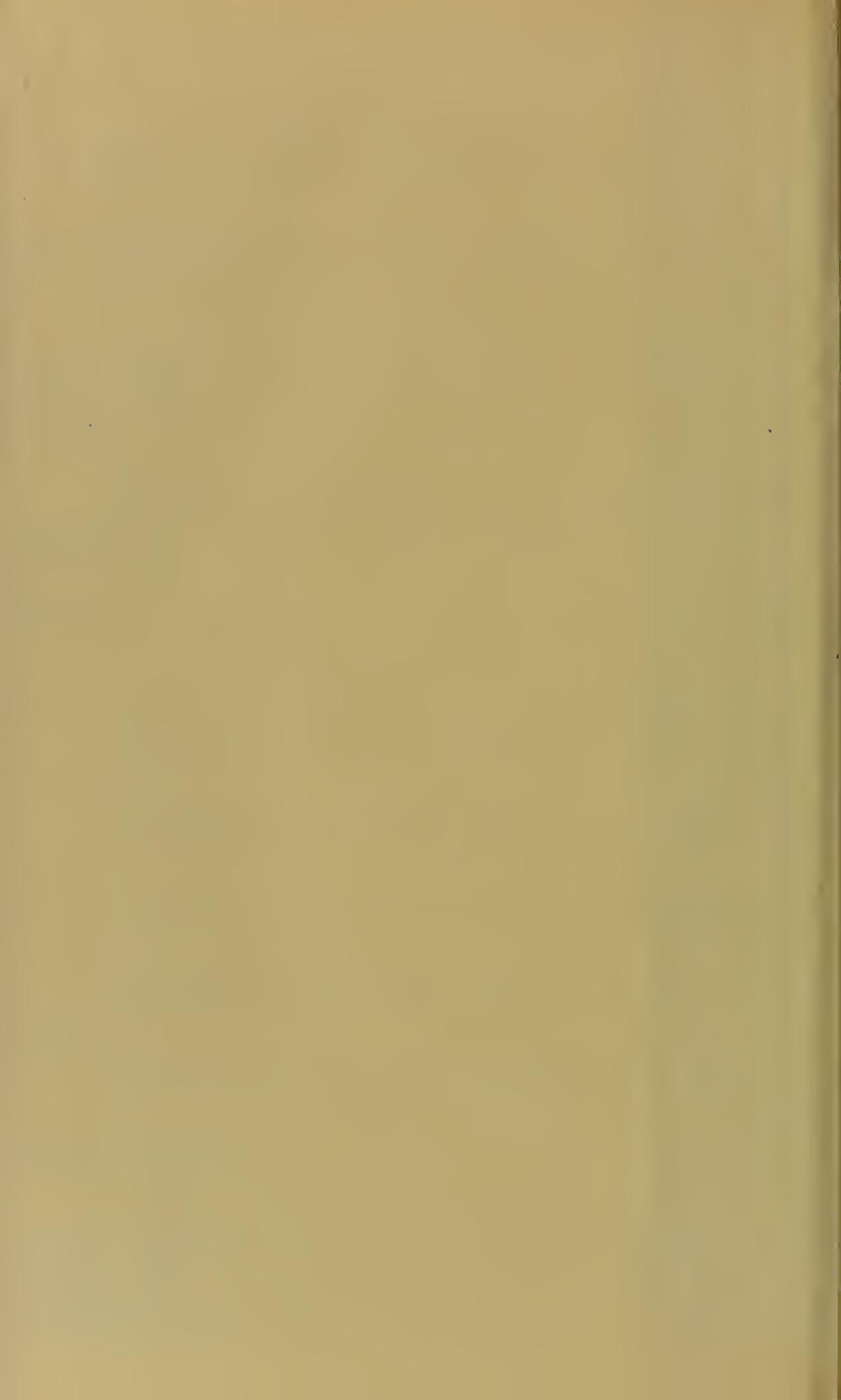
(No. 12) has been sent to the butcher, but the other (No. 64), a more valuable animal, has been retained to be given another chance next spring.

- (9). It will also be noticed that, of the nineteen animals that have been found from first to last to be tuberculous, only nine now remain at Castlecraig, and that, of the ten that have been slaughtered, three only (Nos. 17, 24 and 26) have been apparently still fit for breeding: the other seven having become non or uncertain breeders.
- (10). In several cases the temperatures of the animals could not conveniently be taken 24 hours before inoculation. In one case (No. 64), the note of the temperature at the time of inoculation was mislaid.

The general result may shortly be expressed thus:—Since the first testing, in the winter of 1894-95, the herd has been allowed to increase or decrease in the ordinary way: to increase by the annual crop of calves, and to decrease by sales to the butcher, by sales of breeding animals, and by the slaughter of all tuberculous animals that have become unfit for breeding. The only alteration in the management of the herd has been the annual testing and the separating of the unsound and the sound. In March 1895, forty-one animals out of about eighty were tested, and sixteen—about 20 per cent. of the whole—were tuberculous. In January 1896 the herd of eighty-six animals was tested, and ten—11.63 per cent.—were tuberculous; in November 1896 eighty-three animals were tested, and nine—10.84 per cent.—were tuberculous. And the spread of the disease has been completely arrested.







	TEMPERATURES, MARCH 1895.										TEMPERATURES, JANUARY 1896.										TEMPERATURES, NOVEMBER 1896.									
	24 hours before inoculation.	At inoculation.	4½ hours after.	7½ hours after.	10½ hours after.	13½ hours after.	16½ hours after.	19½ hours after.	24 hours before inoculation.	At inoculation.	6 hours after.	9 hours after.	12 hours after.	15 hours after.	18 hours after.	24 hours before inoculation.	At inoculation.	6 hours after.	9 hours after.	12 hours after.	15 hours after.	18 hours after.								
16. Calved 1890 . . . . .	101°2	101°6	101°1	101°0	101°0	101°4	101°6	100°8	102°1	102°2	101°8	101°8	101°2	101°5	102°2	102°2	102°5	101°7	101°7	102°4	101°7	101°4								
71. Calved 1894, daughter of 16 . . . . .	...	...	...	...	...	...	...	...	102°3	102°7	101°8	101°3	101°9	101°8	101°9	...	...	...	...	...	...	71 was sold in 1896.								
89. Calved 1895, daughter of 16 . . . . .	...	...	...	...	...	...	...	...	102°0	102°0	102°0	101°4	101°2	101°7	101°6	102°1	101°6	101°3	101°7	101°4	101°3	101°9								
101. Calved 1896, son of 16 . . . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	103°2	102°2	102°5	102°7	102°0	102°0	101°6	101°9							
17. Calved 1892 . . . . .	101°1	101°9	101°0	102°4	105°1	105°8	104°6	103°1	...	...	...	...	...	...	...	...	...	...	...	...	...	17 was injured in calving her first calf in 1895 and was slaughtered.								
18. Calved 1891 . . . . .	102°1	102°6	101°5	101°2	101°6	101°2	101°7	101°3	102°8	102°3	102°4	101°8	101°5	101°9	101°6	103°0	102°7	102°3	102°0	102°0	101°8	102°0	54 was bred at Castlecraig; sold in 1896.							
54. Calved 1895, son of 18 . . . . .	...	...	...	...	...	...	...	...	103°1	102°5	103°0	103°4	102°3	102°6	102°3	103°5	103°0	102°8	102°7	102°4	102°0	102°0	104 was bred at Castlecraig.							
104. Calved 1896, son of 18 . . . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	103°3	102°0	102°8	101°9	103°6	102°2	101°8	101°9							
19. Calved 1891 . . . . .	103°1	103°1	103°2	102°7	102°3	102°1	101°9	102°2	102°2	102°4	102°5	101°8	102°0	102°0	102°0	101°7	101°3	101°3	100°9	101°2	101°6	101°6	90 was bred at Castlecraig; sold in 1896.							
90. Calved 1895, son of 19 . . . . .	...	...	...	...	...	...	...	102°4	102°4	102°7	102°5	103°4	102°1	101°7	103°3	102°0	102°8	101°9	103°6	102°2	101°8	101°2	101°2							
112. Calved 1896, daughter of 19 . . . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	103°3	102°0	102°8	101°9	103°6	102°2	101°8	101°2							
20. Calved 1893 . . . . .	102°5	102°8	102°4	102°1	104°3	104°7	103°2	102°1	[101°4	102°0	101°5	101°5	102°3	102°9	103°8	102°9	102°6	102°4	102°3	103°3	107°0	106°2	114 was bred at Castlecraig.							
114. Calved 1896, daughter of 20 . . . . .	...	...	...	...	...	...	...	...	102°3	101°9	102°8	102°2	102°3	101°6	101°3	102°3	101°9	102°8	102°2	101°6	101°3	101°3								
21. Calved 1893 . . . . .	103°0	102°2	101°8	101°0	101°4	101°7	101°3	101°0	102°4	101°7	101°7	105°5	106°6	105°5	106°3	102°9	102°7	103°6	104°3	106°4	106°4	105°0	122 was bred at Castlecraig.							
122. Calved 1896, daughter of 21 . . . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	102°7	102°6	102°1	102°1	102°0	101°8	101°5	101°5							
*22. Calved 1893 . . . . .	102°1	102°5	102°2	102°3	102°0	101°6	101°6	101°1	101°7	102°1	101°3	101°7	101°5	101°3	101°2	102°5	102°5	102°5	102°3	101°8	101°6	101°5	24 was a heifer when tested, and was slaughtered shortly after.							
24. Calved 1893 . . . . .	102°6	102°2	102°6	103°2	105°6	105°3	104°6	103°0	...	...	...	...	...	...	...	101°9	101°6	101°9	101°9	100°6	101°2	101°3	101°3							
*25. Calved 1893 . . . . .	102°2	102°4	102°1	101°0	101°3	101°3	101°0	101°2	102°9	101°6	101°4	100°9	101°1	101°7	101°2	101°9	101°9	101°9	101°3	100°9	100°8	101°1	26 was a heifer when tested, and was slaughtered shortly after.							
26. Calved 1893 . . . . .	102°2	103°0	102°2	102°6	104°0	105°2	104°7	103°7	...	...	...	...	...	...	...	101°9	101°9	101°3	100°9	100°9	100°8	101°1	101°1							
124. Calved 1896, daughter of 27 . . . . .	...	...	...	...	...	...	...	102°4	102°4	102°0	101°7	101°4	101°6	101°4	102°7	102°2	102°2	102°1	102°7	102°4	102°2	124 was bred at Castlecraig.								
27. Calved 1893 . . . . .	102°2	102°4	102°0	102°0	101°7	101°4	101°6	101°4	102°7	102°2	102°0	102°1	100°7	101°6	101°1	101°9	102°3	102°6	103°0	102°7	102°7	102°4	102°2							
113. Calved 1896, daughter of 28 . . . . .	...	...	...	...	...	...	...	102°5	103°5	102°8	103°2	102°8	102°3	102°7	102°5	102°5	102°5	103°0	101°9	101°3	101°9	94 was bred at Castlecraig; sold in 1896.								
113. Calved 1896, daughter of 28 . . . . .	...	...	...	...	...	...	...	104°7	102°5	101°9	102°2	101°9	101°9	101°7	102°5	102°5	102°3	102°3	101°9	101°4	101°9	113 was bred at Castlecraig.								
29. Calved 1885 . . . . .	102°1	100°6	101°4	100°8	100°4	101°1	101°2	101°2	103°3	103°0	103°5	103°9	106°1	106°0	103°6	101°5	102°2	101°0	100°7	101°0	101°4	100°8	29 had a dead premature calf in October 1896, and has since been slaughtered.							
30. Calved 1891, daughter of 29 . . . . .	102°3	101°6	101°5	101°4	101°1	101°7	102°2	101°5	102°6	103°2	102°0	101°4	101°1	101°6	102°0	102°0	101°9	102°4	101°9	100°9	100°9	100°8	101°1							
76. Calved 1895, daughter of 30 . . . . .	...	...	...	...	...	...	...	...	102°0	102°4	101°9	101°9	101°3	101°3	101°3	103°3	102°6	103°0	102°7	102°7	102°4	102°2								
102. Calved 1896, son of 30 . . . . .	...	...	...	...	...	...	...	...	101°8	102°5	102°0	101°5	101°2	101°3	100°9	102°5	101°9	102°3	102°1	101°9	101°4	101°9								
75. Calved 1895, daughter of 29 . . . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	102°5	101°9	101°7	101°5	101°8	102°3	101°6	120 was bred at Castlecraig.							
120. Calved 1896, daughter of 29 . . . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	101°5	102°2	101°0	100°7	101°0	101°4	100°8								
31. Calved 1891 . . . . .	102°2	101°6	101°8	101°6	101°6	101°4	102°0	101°8	102°4	102°6	103°5	102°8	101°8	101°8	102°5	101°5	101°0	101°3	101°3	100°8	101°7	31 was bred at Castlecraig.								
60. Calved 1894, daughter of 31 . . . . .	...	...	...	...	...	...	...	...	102°4	102°0	102°0	101°9	101°4	101°4	101°2	102°5	101°6	101°0	101°0	101°4	100°8	60 was bred at Castlecraig; sold in 1896.								
93. Calved 1895, son of 31 . . . . .	...	...	...	...	...	...	...	...	105°1	102°5	102°8	103°2	102°7	102°6	102°2	102°5	102°1	101°7	101°8	101°0	101°2	93 was bred at Castlecraig; sold in 1896.								
119. Calved 1896, daughter of 31 . . . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	102°5	102°1	101°7	102°5	101°8	101°0	101°2	119 was bred at Castlecraig.							
32. Calved 1890 . . . . .	102°2	101°2	101°4	102°0	102°1	102°3	101°7	101°8	102°8	102°5	103°1	102°6	101°8	101°9	101°7	101°8	101°6	101°0	101°8	101°7	101°4	101°4	58 was bred at Castlecraig. She is now a dairy cow. Her first calf (1896) died at birth.							
58. Calved 1893, daughter of 32 . . . . .	...	...	...	...	...	...	...	...	102°3	102°2	102°3	102°1	102°3	102°1	102°1	101°8	101°6	101°8	101°7	101°5	102°2	61 was bred at Castlecraig. She was being fed for the butcher, and was not tested in Nov. 1896.								
61. Calved 1894, daughter of 32 . . . . .	...	...	...	...	...	...	...	...	102°5	101°9	102°2	101°5	101°1	101°2	100°5	105°1	102°5	102°0	102°4	102°1	102°1	95 was bred at Castlecraig; was sold in 1896.								
95. Calved 1895, son of 32 . . . . .	...	...	...	...	...	...	...	...	105°1	102°5	102°7	102°4	102°0	102°2	102°1	102°6	102°1	102°2	102°4	101°7	101°6	110 was bred at Castlecraig.								
110. Calved 1896, son of 32 . . . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	102°6	102°1	102°2	102°4	101°7	101°3	101°6	110 was bred at Castlecraig.							
33. Calved 1891 . . . . .	102°8	102°8	102°8	102°8	102°4	102°6	102°4	102°4	103°0	102°6	102°3	101°7	102°3	101°5	102°5	101°7	102°0	101°0	101°4	101°4	101°0	101°0	33 was bred at Castlecraig.							
67. Calved 1894, daughter of 33 . . . . .	...	...	...	...	...	...	...	...	101°9	102°7	101°4	101°3	101°6	101°3	101°5	102°2	102°3	101°9	101°6	101°4	101°4	67 was bred at Castlecraig.								
96. Calved 1895, son of 33 . . . . .	...	...	...	...	...	...	...	...	105°2	102°6	103°0	103°1	103°0	102°8	102°3	102°5	102°7	102°9	102°7	102°6	103°7	96 was bred at Castlecraig; sold in 1896.								
99. Calved 1896, son of 33 . . . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	103°8	102°7	102°9	103°0	102°7	102°6	103°7	99 was bred at Castlecraig.							



	TEMPERATURES, MARCH 1895.										TEMPERATURES, JANUARY 1896.										TEMPERATURES, NOVEMBER 1896.									
	24 hours before inoculation.	At inoculation.	4 hours after.	7½ hours after.	10 hours after.	13½ hours after.	16½ hours after.	19½ hours after.	24 hours before inoculation.	At inoculation.	6 hours after.	9 hours after.	12 hours after.	15 hours after.	18 hours after.	24 hours before inoculation.	At inoculation.	6 hours after.	9 hours after.	12 hours after.	15 hours after.	18 hours after.								
34. Calved 1892 . . . . .	102°2	102°2	102°3	101°8	102°1	102°4	101°5	101°7	102°9	102°2	102°0	101°9	102°2	101°9	101°6	102°1	103°0	102°3	102°0	101°8	102°0	101°7	34 was bred at Castlecraig.							
92. Calved 1895, son of 34 .	...	...	...	...	...	...	...	...	105°4	102°8	102°7	102°6	102°4	102°3	102°0	...	103°0	101°9	102°8	102°0	102°4	101°5	102°0	92 was bred at Castlecraig; sold in 1896.						
125. Calved 1896, daughter of 34 .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	103°2	102°8	102°7	102°4	102°4	101°7	102°8	125 was bred at Castlecraig.							
35. Calved 1892 . . . . .	[102°2	102°2	101°4	101°4	101°4	104°4	103°6	103°6]	[102°4	103°0	102°3	102°1	103°4	102°9	102°7]	102°6	102°6	102°7	105°0	106°7	104°3	106°0	35 was removed from the unsound to the sound herd at the second testing and back again at the third.							
86. Calved 1895, daughter of 35 .	...	...	...	...	...	...	...	...	102°4	102°4	101°7	101°4	101°3	101°2	101°7	...	...	...	...	...	...	...	86 was bred at Castlecraig; sold in 1896.							
106. Calved 1896, son of 35 .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	103°2	102°8	102°7	102°4	102°4	101°7	102°8	106 was bred at Castlecraig.							
36. Calved 1891 . . . . .	102°2	101°4	102°2	101°4	101°6	101°5	102°0	101°4	102°6	102°6	102°4	101°9	102°2	101°9	102°0	101°5	101°5	101°4	101°1	101°4	101°3	101°0	72 was bred at Castlecraig.							
72. Calved 1894, daughter of 36 .	...	...	...	...	...	...	...	...	101°5	102°8	101°5	101°2	100°2	100°5	101°1	102°3	102°6	101°6	102°2	102°0	101°3	101°2	45 was bred at Castlecraig; sold in 1896.							
45. Calved 1895, son of 36 .	...	...	...	...	...	...	...	...	103°0	102°6	103°4	103°3	103°0	102°3	102°0	...	...	...	...	...	...	...	111 was bred at Castlecraig.							
111. Calved 1896, daughter of 36 .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	102°9	102°8	102°5	103°0	102°9	102°0	101°6	85 was bred at Castlecraig.							
37. Calved 1892 . . . . .	[102°8	102°4	101°7	101°7	102°0	104°3	102°5	102°8]	103°0	103°2	104°3	106°7	107°7	105°5	106°6	103°5	103°2	104°0	105°4	107°5	106°6	106°2	107 was bred at Castlecraig, and was suckled by cow No. 55.							
85. Calved 1895, daughter of 37 .	...	...	...	...	...	...	101°8	102°2	102°1	102°2	101°7	101°7	102°2	101°7	101°7	101°9	101°0	101°2	100°3	101°3	101°6	102°1	38. This cow's calf of 1895 was sold between the preliminary and the general testings of 1895-96.							
107. Calved 1896, son of 37 .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	103°0	102°5	102°3	101°9	102°0	102°1	102°1	101°1	39 is a bull.							
*38. Calved 1892 . . . . .	102°2	101°4	101°7	101°7	100°8	100°8	101°6	101°2	102°0	101°6	101°2	100°0	100°1	101°4	100°9	102°3	101°9	101°0	100°9	100°3	100°4	101°1	40 is a bull.							
39. Calved 1893 . . . . .	...	102°4	101°6	101°8	101°4	101°6	101°9	101°9	102°1	102°7	102°1	102°4	101°8	101°5	101°3	101°3	101°5	101°3	100°8	101°4	100°6	101°7	48 was bred at Castlecraig; sold in 1896.							
40. Calved 1888 . . . . .	...	101°5	100°7	100°7	100°0	100°1	101°3	100°9	101°3	101°1	100°0	101°1	99°7	100°3	100°7	101°0	101°3	100°0	100°0	100°3	99°8	100°4	100°8	51 was bred at Castlecraig; sold in 1896.						
48. Calved 1895 . . . . .	...	...	...	...	...	...	...	...	102°1	102°3	102°2	102°0	101°9	101°6	101°6	...	...	...	...	...	...	...	55 was bred at Castlecraig.							
51. Calved 1895 . . . . .	...	...	...	...	...	...	...	...	101°8	102°1	102°7	102°4	102°0	102°3	101°6	...	...	...	...	...	...	...	81 was bred at Castlecraig; sold in 1896.							
55. Calved 1891 . . . . .	...	...	...	...	...	...	...	...	103°3	102°8	102°5	102°7	103°5	104°2	103°0	101°5	101°4	101°4	101°3	101°5	101°1	101°4	121 was bred at Castlecraig and was suckled by cow No. 37.							
81. Calved 1895, daughter of 55 .	...	...	...	...	...	...	...	...	101°2	102°2	101°8	101°7	101°9	101°6	101°8	...	...	...	...	...	...	...	56 was bred at Castlecraig.							
121. Calved 1896, daughter of 55 .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	101°6	101°6	101°6	101°9	101°6	102°1	100°7	103°2	80 was bred at Castlecraig; sold in 1896.							
56. Calved 1892 . . . . .	...	...	...	...	...	...	...	...	102°2	102°4	102°5	102°3	102°2	101°7	101°7	101°5	101°4	101°4	100°7	101°7	101°0	101°3	79 was bred at Castlecraig; sold in 1896							
80. Calved 1895, daughter of 56 .	...	...	...	...	...	...	...	...	102°5	102°7	102°2	101°9	101°0	101°7	101°6	...	103°1	102°7	102°8	102°8	102°6	102°6	103°2	108 was bred at Castlecraig.						
103. Calved 1896, son of 56 .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	102°2	102°6	102°0	101°7	101°7	101°7	101°8	57 was bred at Castlecraig.							
57. Calved 1891 . . . . .	...	...	...	...	...	...	...	...	102°6	102°8	102°0	101°7	101°7	101°8	101°7	101°6	101°3	100°8	101°0	101°4	101°0	101°0	79 was bred at Castlecraig; sold in 1896							
79. Calved 1895, daughter of 57 .	...	...	...	...	...	...	...	...	102°0	102°8	102°1	102°0	102°2	101°2	101°9	...	103°0	102°5	102°9	102°2	102°0	101°7	101°8	108 was bred at Castlecraig.						
108. Calved 1896, son of 57 .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	102°0	102°4	102°3	101°6	101°6	102°2	101°5	101°0	59 was bred at Castlecraig.						
59. Calved 1894 . . . . .	...	...	...	...	...	...	...	...	102°7	102°3	102°7	102°8	102°5	101°5	101°7	102°6	103°0	102°6	102°1	102°3	101°8	101°9	62 was bred at Castlecraig.							
62. Calved 1894 . . . . .	...	...	...	...	...	...	...	...	101°5	102°3	101°6	101°4	101°6	101°6	101°1	102°5	103°0	102°0	101°8	102°0	102°0	101°9	64 was bred at Castlecraig.							
*64. Calved 1893 . . . . .	...	...	...	...	...	...	...	...	103°5	101°8	101°3	101°2	100°3	101°5	100°2	...	102°4	101°7	102°0	101°9	101°4	101°4	101°4	66 was bred at Castlecraig.						
68. Calved 1894 . . . . .	...	...	...	...	...	...	...	...	102°5	102°6	101°8	101°7	100°7	101°2	101°1	102°3	102°4	102°2	101°8	101°4	101°6	101°2	70 was bred at Castlecraig; sold in 1896.							
69. Calved 1894 . . . . .	...	...	...	...	...	...	...	...	101°8	102°1	101°7	101°6	101°3	101°2	101°9	101°8	101°4	101°7	101°4	101°3	101°3	101°3	73 was bred at Castlecraig.							
70. Calved 1894 . . . . .	...	...	...	...	...	...	...	...	102°1	102°9	102°0	101°4	100°9	101°3	101°3	...	...	...	...	...	...	...	82 was bred at Castlecraig; was being fattened and was not tested in November 1896.							
73. Calved 1894 . . . . .	...	...	...	...	...	...	...	...	102°2	102°6	101°3	101°3	101°5	100°6	102°0	102°2	100°9	100°9	101°4	101°6	101°0	101°0	97 was bred at Castlecraig. She has been used as a dairy cow and her calves have not been kept. Her calf of 1896 was premature and was destroyed.							
74. Calved 1894 . . . . .	...	...	...	...	...	...	...	...	102°5	102°3	102°0	101°8	101°3	101°6	101°3	...	100°7	101°9	101°8	101°5	100°9	101°0	101°0							
82. Calved 1895 . . . . .	...	...	...	...	...	...	...	...	101°4	102°2	102°0	101°6	101°4	102°0	101°0	...	...	...	...	...	...	...								
87. Calved 1895 . . . . .	...	...	...	...	...	...	...	...	102°1	101°9	102°9	101°7	101°6	102°6	101°8	102°1	101°7	101°6	101°6	101°6	101°2	101°2								
88. Calved 1895 . . . . .	...	...	...	...	...	...	...	...	101°4	102°7	102°4	101°5	101°2	101°7	101°5	101°6	101°7	101°5	101°5	101°6	101°7	101°7								
97. Calved 1891 . . . . .	...	...	...	...	...	...	...	...	102°0	102°4	101°6	102°3	102°2	102°2	101°5	101°5	101°9	101°8	101°6	101°6	101°6	101°0								

